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Price and Monetary Convergence in Currency Unions

The Franc and Rand Zones

Patrick Honohan

Inflation and interest rates in Africa's currency unions tend to follow the patterns set in the dominant countries, France and South Africa.

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This paper — a product of the Financial Policy and Systems Division, Country Economics Department — is part of a larger effort in PRE to explore regional integration in financial systems. Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Wilai Pitayatonakarn, room N9-003, extension 37666 (18 pages with figures and tables).

Theory suggests that a currency union will impose significant macroeconomic disciplines on its members. Honohan examines the two main surviving currency zones — the franc and rand zones in Africa — to learn whether and to what extent certain generally accepted theory is confirmed by the data.

As with most fixed exchange rate systems, the African currency unions have a dominant or "core" member — France in the franc zone and the Republic of South Africa in the rand zone. Honohan focuses on the small members at the periphery, for whom inflation and interest rates are assumed to be imported from the core.

On the whole, the facts support generally accepted theory:

Price levels converge, at least for tradable goods. The pattern of consumer price inflation is determined largely by core country inflation in the long run, although convergence is slow.

The limited evidence available suggests that uncontrolled interest rates also converge to core country levels.

And in most cases expansion of domestic credit in one small country spills over into its balance of payments rather than generating local inflation.

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PRICE AND MONETARY CONVERGENCE IN CURRENCY UNIONS: THE FRANC AND RAND ZONES

Introduction.

Why should a country choose to sacrifice monetary independence by joining a currency union? One obvious reason is to achieve exchange rate, price and monetary stability, as membership of an union provides an otherwise hard-to-achieve credibility for a policy of monetary restraint. Such stability should be conducive to overall economic performance[2]. That membership can achieve this objective is suggested by economic theory which implies that a currency union will impose significant macroeconomic disciplines on its members. For example, provided there is sufficient economic integration with the rest of the world, the law of one price should lead to convergence of price levels, at least for what may be regarded as tradeable goods. Likewise arbitrage would imply convergence of interest rates. Finally, expansion of domestic credit in one small member should spill over into its balance of payments rather than generating local inflation. This paper looks at the two main surviving currency unions, the franc and rand zones in Africa, to see whether and to what extent these generally accepted propositions find confirmation in the data.

As with most fixed exchange rate systems[3] the African currency unions have a dominant or "core" country, France in the case of the franc zone and the Republic of South Africa (RSA) in the case of the rand zone. Because these dominant countries are so much larger than the rest[4], there is no need to consider feedback from periphery to core (and thus the extensive literature on policy cooperation in the EMS has no application here). Our focus is on the small members in the "periphery" and for them there is the additional presumption that inflation and interest rates will be imported from the core.

On first inspection, the data suggests a number of deviations from the theoretical picture. For example, cumulative consumer price inflation 1980-87 in the franc zone varied from 30 per cent (Burkina Faso) to 100 per cent (Central African Republic). Widespread concern has also been expressed

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2 The overall economic performance of the franc zone countries compared with other countries has been the subject of recent investigations (Devarajan and de Melo, 1987a and b, Guillaumont and Guillaumont 1988, Guillaumont, Guillaumont and Plane, 1988).

3 For the EMS, see Honohan and McNelis (1989), for Bretton Woods and the Gold Standard, see Giovannini (1988).

4 The GDP of France is 21 times the combined GDP of the 13 CFA countries; that of RSA some one hundred times the combined GDP of Lesotho and Swaziland.

about a loss of competitiveness in several of the African franc zone countries. Furthermore the government of Cameroon has borrowed domestically at rates which are several percentage points below the yield on French Government paper.

Nevertheless, as will be shown below, closer examination suggests that consumer price inflation is largely determined by core country inflation in the long run. Convergence to core inflation is, however, slow, and in particular fiscal policy may have a small transtory influence. The limited evidence available suggests that uncontrolled interest rates do converge to core country levels. As predicted by theory variations in the volume of domestic credit are seen in most cases to spill over into the balance of payments.

A methodological note is appropriate at this point. As we are interested in time series properties of price and monetary variables, we really need to look at quarterly data in addition to the annual series. The quality of sub-annual data in the countries under examination is generally poor. However monetary and price data are available. Our research strategy is to attempt to meet the econometric problem of underspecificied equations (due to lack of suitable non-monetary quarterly data) by use of time trend and intercept shift dummy variables.

1 The African currency unions

Most African countries entered the post-colonial era with fixed exchange rates vis-a-vis the pound sterling or the franc and fairly open capital accounts with their former colonizing powers. One by one, however, the sterling area countries abandoned this link and in 1986 the Gambia became the last African country to move from sterling[5].

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5 Members of the East African Economic Community had a common currency area in the years before 1977. The Kenya, Uganda and Tanzania shillings continued to share a common parity until 1979, but by 1981 they had gone their separate ways. The Liberian currency still retains its *de jure* link with the US dollar.

In contrast, most of the former French colonies stayed[6] with the so-called CFA franc and with a fixed French franc parity[7]. The CFA zone comprises two distinct currency unions, the UMOA (West African) and the BEAC (Central African) zone, each with its own central bank (the BCEAO and the BEAC) and each with its own CFA franc[8]. Between them the two unions have thirteen member countries[9] with a total population of some seventy million. Along with the fixed exchange rate, the members of the CFA zone have traditionally retained an open international capital market, with statutory freedom of capital movements among the member countries and with France[10].

Although the members of the CFA zone display quite a variety in terms of size and prosperity, they are all dependent on one or two primary products for the bulk of their exports to the industrial world, but otherwise their economies display considerable variations. In much of what follows we concentrate on the two largest economies, namely, Cote d'Ivoire (which accounts for 38 per cent of UMOA GDP) and Cameroon (60 per cent of BEAC zone GDP).

The Rand zone comprises the Republic of South Africa, Lesotho and Swaziland. Lesotho and Swaziland have their own currencies and Central Banks, but these currencies are freely exchangeable for South African rand at one-for-one and the rand circulates freely[11] in these countries. There is freedom of capital

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6 Guinea (Conakry) abandoned the French franc on independence; Mauritania and Madagascar stayed with the French franc until 1973, though neither joined a union. Mali left the Franc zone after independence, only to rejoin it in 1967, and to become a member of the UMOA in 1984. Togo was not a founder member of UMOA either, but joined after a change of government in 1963. In 1985 Equatorial Guinea became both the smallest member of the CFA zone and the first member not to have been a former French colony.

7 Although it has shrunk over the years, the French franc zone is somewhat larger than the CFA zone plus France. Monaco and the Comoros Islands (north of Madagascar) together with a handful of overseas dependencies of France make up the rest of the zone.

8 The two currencies have slightly different names but share the acronym "CFA franc" by which the colonial currency was also known. The currencies, both valued at one-fiftieth of the French franc, have retained this peg for forty years.

9 They are: Benin, Burkina Faso, Cote d'Ivoire, Mali, Niger, Senegal and Togo (UMOA); Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, and Gabon (BEAC).

10 The operation of the CFA zone is examined in detail in Bhatia (1985) and in Guillaumont and Guillaumont (1984). There have been some recent changes in the operating rules of the UMOA (1989).

11 Rands may form as much as much as one-half or more of total currency circulation in these countries.

movements between Lesotho, Swaziland and South Africa[12]. Lesotho and Swaziland are both landlocked, Lesotho being completely surrounded by South Africa. While Swaziland has a reasonably diversified economy by African standards, Lesotho's national income is heavily dependent on that earned by miners working in South Africa.

Monetary Policy

Each of the CFA Central Banks establishes an annual monetary program for its member countries with the objective of protecting its external reserves. The program translates into national targets for domestic credit, public and private. These are implemented through a variety of instruments including bank-by-bank credit ceilings and refinancing quotas for each bank at the Central Bank. Most interest rates are administratively controlled, including bank lending rates for different categories of credit. However banks are free to negotiate interest rates for wholesale deposits. Commercial bank recourse to Central Bank refinancing is very heavy in most countries, accounting on average for a third of commercial bank lending. Some of this refinancing is provided at concessional rates with ceilings on the onlending rates. The matrix of interest rates is set at a common level throughout the UMOA, whereas in the BEAC zone only the Central Bank's intervention rates are common across the zone. Of course, France has its own Central Bank, but it is also represented in each of the CFA Central Banks.

Lesotho and Swaziland determine their monetary policy independently of each other and of South Africa. South Africa has no representation in either of the Central Banks of Lesotho or Swaziland. Accordingly there is no formal arrangement for common interest rates in the rand zone[13].

2 Convergence of inflation

The annual trends in consumer price indices in CFA countries over a quarter century are shown in Figure 1a. These show that, despite the wide divergences which has occurred between cumulative inflation rates over as

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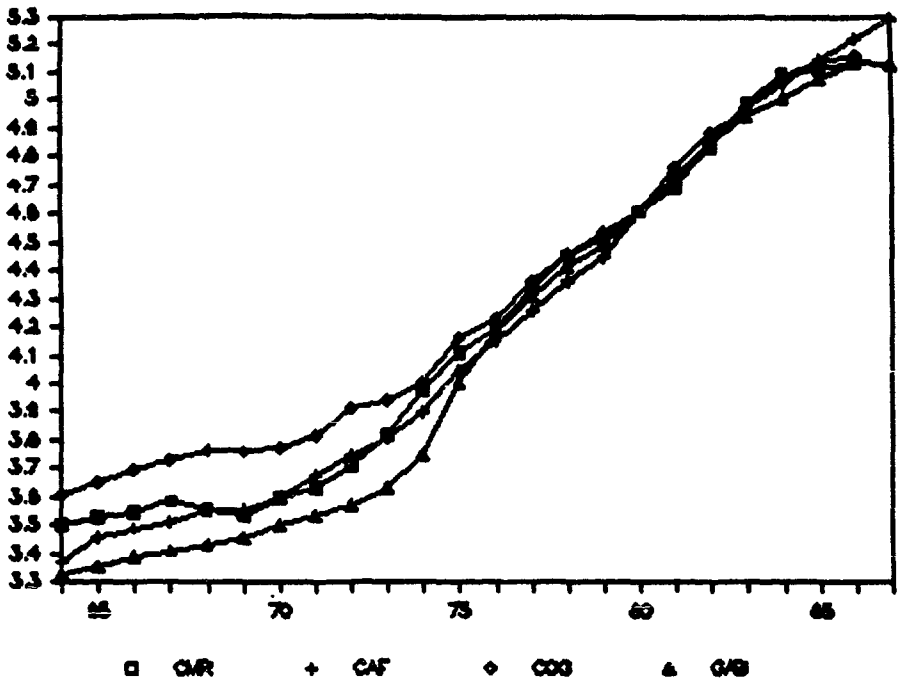
12 Apart from the US dollar, the only other currencies to which other currencies are now pegged are the Australian dollar (Kiribati and Tonga), and the Indian rupee (Bhutan). In each of these cases the pegging country is very small and dependent on the peg country.

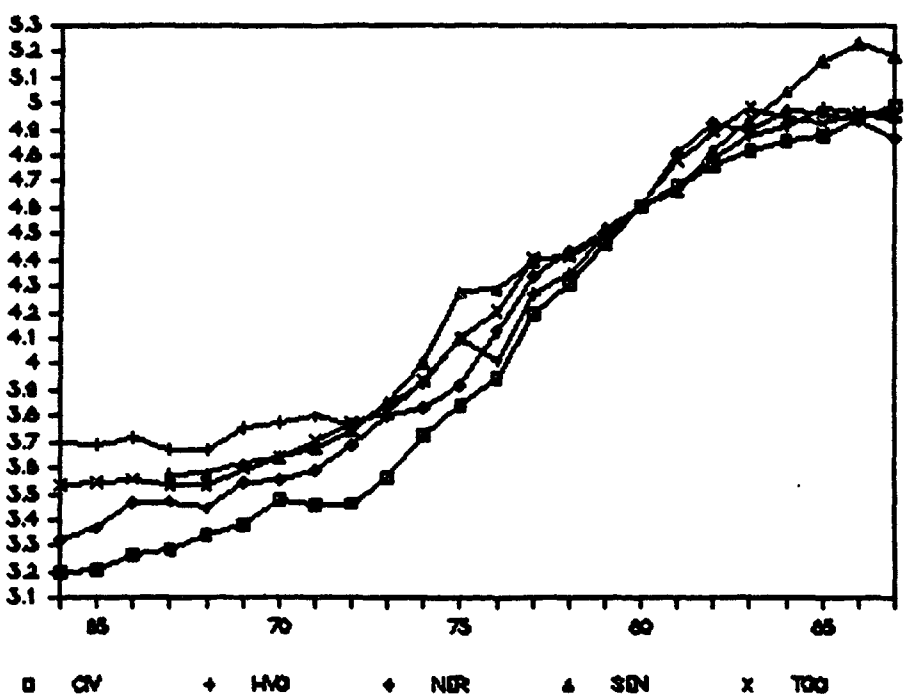
13 In effect, the formal arrangements under the Common Monetary Area agreement between the rand zone members relate to reserve holdings, to common application of exchange controls, and to the payment of seignorage by South Africa to Lesotho and Swaziland in respect of the estimated quantity of rand circulating in those countries.

FIGURE 1A

BEAC: (log) CPI



UMOA: (log) CPI



long as six or seven years (as mentioned above), in the longer run the price indices appear to have a common trend. A common trend is even more pronounced in the data for the rand zone (Figure 1b)

2.1 Principal Component Analysis of the CFA zone

In order to examine the degree of price level convergence in the CFA zone more closely, the annual data for the (log-)CPI of France and of the nine CFA countries for which this was available, was examined for the period 1964-87[13]. The hypothesis to be considered is that most of the variation in these countries' price levels can be summarised by a single common factor. To this end the principal components of the price data were computed[14]. The striking result is that the first principal component explains 99.3% of the total variation in this data set. The bulk of inflation in the CFA countries and France is essentially a single common variable. The second principal component accounts for a further 0.3%, while the third can only manage just over 0.1%. At most, the first two components can be of interest[15].

Figure 2 plots actual CPI for most of the countries together with the first two principal components. Each panel shows a country's CPI against the same background of the two principal components. As can be seen, the first principal component tracks actual CPI rather closely: in fact the correlation between the first component and the CPI is better than 0.992 for each country. The loading of each country on the first component does

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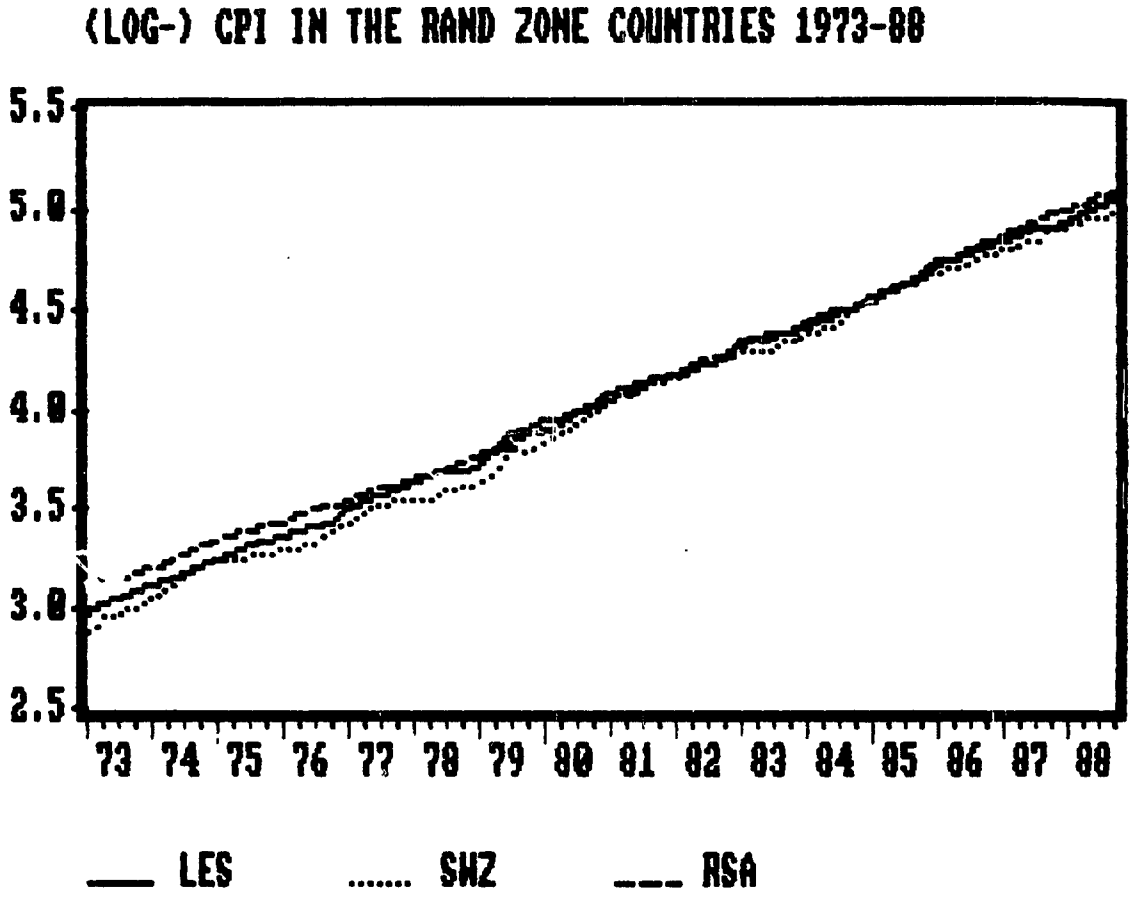
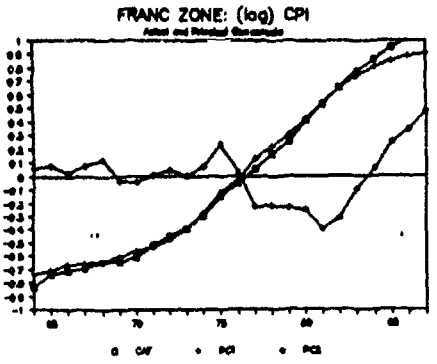
13 Note: figures for Senegal 1964-66 were extrapolated backwards. All of the data used in the paper is from *International Financial Statistics* with the exception of the average lending rates in Lesotho (Section 4 below) which were kindly provided by the Central Bank of Lesotho.

14 Principal components analysis is a technique used when it is thought possible to summarize most of the variation in a large number of variables - in this case the CPIs for the ten countries - by just a few artificially constructed variables. Loosely speaking, the first principal component is an artificial variable constructed so that it has the highest possible correlation with the collection of variables being examined; the second principal component has the highest correlation with the residuals left after subtracting out what is explained by the first principal component. The "loading" of a particular country on the first principal component is the regression coefficient obtained by regressing the country's CPI on that component.

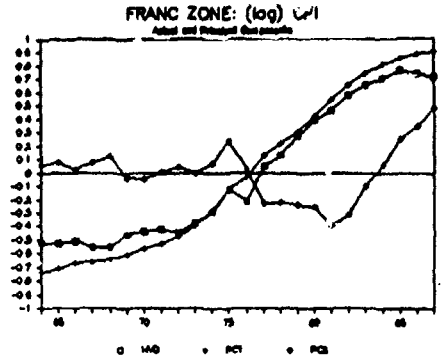
15 A number of standard tests reject the hypothesis that all roots but the first are zero, hence, despite its small explnatory power, it seems reasonable to examine briefly the loadings on the second component. The first principal component of the differenced price series explains 88.2 per cent of total variation in that series, with a further 4.9 per cent and 4.0 per cent being explained by the second and third components.

FIGURE 1B

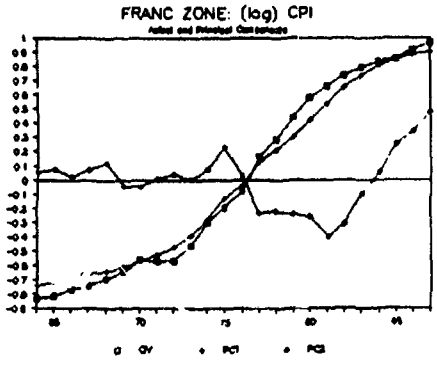

(LOG-) CPI IN THE RAND ZONE COUNTRIES 1973-88
5.5
5.0
4.5
4.0
3.5
3.0
2.5
73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88
LES
SWZ
RSA



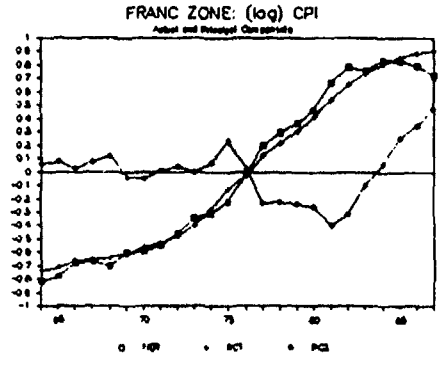
Central African Republic



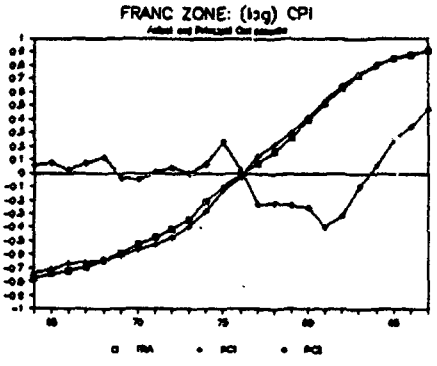
Burkina Faso



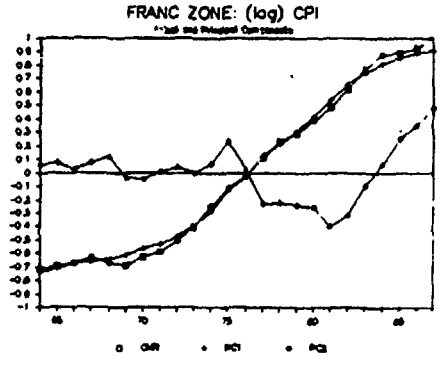
Cote D'Ivoire



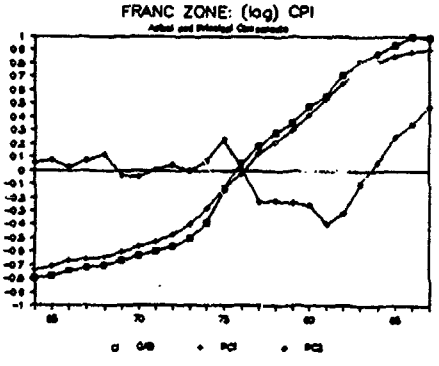
Niger



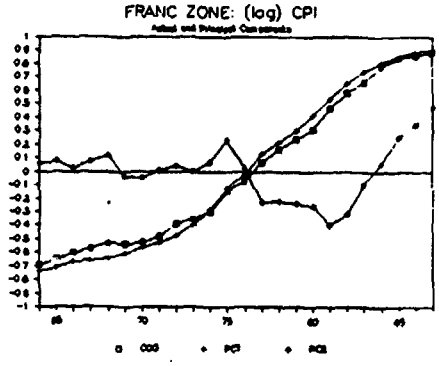
France



Cameroon



Gabon



Congo

FIGURE 2 CPI: Actual and Principal Components 1964-87

not differ very much, though some of the differences are significant, with the outliers being Burkina Faso (16% lower), Cote d'Ivoire (11% higher) and Gabon (12% higher), implying that these countries may respond systematically to rising zone-wide price level with a lower (Burkina Faso) or higher (Cote d'Ivoire, Gabon) amplitude. These differences can also be detected visually in the figure: note, for example, that the increase in Burkina Faso's CPI is smaller than that in the first component. It is also evident from visual inspection that this first principal component tracks the French inflation closer than that of the other countries (except Gabon). This is confirmed statistically (the correlation for France is better than 0.998). Therefore it is safe to assert that the first principal component reflects French inflation and that this is the determining factor for the great bulk of inflation in the CFA zone[16].

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16 With nominal exchange rate stability vis-a-vis the French franc, and a common trend in domestic inflation it is natural to assume that the CFA countries should have achieved stability of the real exchange rate, at least in terms of relative consumer prices at home and abroad. Despite much discussion of this issue, it appears to be unresolved in the literature. In a recent paper, de Macedo (1984) asserted that the franc zone countries had "achieved nominal stability at the expense of real stability", an assertion that was echoed by Devarajan and de Melo (1987a), but contradicted by Guillaumont, Guillaumont and Plane (1988) quoting Paraire (1988). It is certainly true, and was shown by de Macedo, that nominal exchange rate stability has not entailed real stability, but that does not imply that alternative regimes have provided stability. Paraire used a sample of annual exchange rate and CPI data for 76 developing countries to show that CFA countries had, on average, lower variances of their nominal and real effective exchange rate indices than other developing countries in the period 1970-83. His methodology was, however, marred by his neglect of the distortions created by the enormous variances generated in high inflation countries.

A more robust approach is to look at country rankings. Furthermore, in order to take account of equilibrium trends in the real exchange rate it is worth examining variances about a trend line or autoregression. My 1982 study of a 105 country sample provides the necessary data are provided in Honohan (1983). It strongly suggests that, on these measures, the CFA countries have had real exchange rates neither more nor less variable than the average. The mean rank of the CFA countries in the sample varied between 42 and 67 (out of 105) depending on the measure used. The hypothesis that the individual rankings of CFA countries were randomly distributed among the 105 countries in the sample cannot be rejected (chi-squared test) even at the 10 per cent level.

The implication is that adherence to the French franc has not given the members any greater variability of the real exchange rate than has been experienced by other countries. All of this, however, relates to consumer prices; comparable data on relative factor costs might tell a very different story, but they are not readily available.

The second principal component predicts a blip in inflation in 1975, lower than average inflation in 1976 and 1977, and higher than average inflation from 1982 to 1987. In a regression of each country's CPI on the first two components, the second is insignificant in the case of three countries, France, Burkina Faso and Gabon. In three other cases, Cote d'Ivoire, Niger and Togo the weighting is negative, while in the remainder, the weighting is positive[17]. Were it not for the positive loading in the case of Senegal, this second component could be seen as a BEAC/UMOA distinguishing factor. However, its small contribution to overall variance suggests that it may not be an independent common factor. Accordingly we proceed to look at the individual country residuals after subtracting only the first principal component.

Explaining residual inflation differences.

Subtracting the (re-scaled) first principal component from the individual country CPIs leaves us with a residual inflation factor which displays quite a variety of patterns between the different countries.

> Burkina Faso and Congo have a positive residual in the 1970s, negative in the 1980s; the experience of Gabon is almost the reverse.
>
> Cameroon and the Central African Republic have positive residuals chiefly after about 1983, whereas Cote d'Ivoire and Niger have positive residuals chiefly before 1983.

In addition to unobservable country-specific disturbances which may have contributed, these residuals might be explained on the basis of the different individual country experiences with regard to expenditure or monetary variables. To explore this possibility, data on monetary aggregates, exports and government and private consumption were assembled for the five UMOA countries for which CPI data was available. These variables were expressed for each year 1970-86 as a deviation from the mean share in the union. (Thus in the case of exports for Niger in 1975, for example, the variable used was the difference between Niger's percentage share in total UMOA exports in 1975 and Niger's mean share 1970-86.) Regression analysis of the pooled country data was then used to identify possible correlations between these measures of monetary and spending conditions on the one hand and residual inflation differences on the other hand.

---

17 This can also be seen in Figure 2 where, for example, the actual CPI (marked by squares) lies above the first principal component during 1976-83, a time when the second principal component takes on negative values.

The results of this analysis suggest that government spending, especially when financed by credit, contributes to the transitory CPI divergences which have been noted. Neither the money stock, not private credit has any independent explanatory power, nor does the value of exports[18]. A sample of the regression results is contained in Table 1.

2.2 Dynamic impact of core prices on periphery inflation.

Turning to quarterly data in order to explore the short-term dynamics of inflation transmission, regression equations were estimated for inflation in the largest countries in the CFA zone, i.e. Cote d'Ivoire and Cameroon, and in Lesotho and Swaziland. An appropriate type of model to capture this kind of transmission is the error-correction model, according to which there is both a short-term and a long-term transmission between core and periphery inflation. A surge in core inflation leads to an early response in periphery inflation; to the extent that the change in the price level at the core does not immediately pass through to the periphery, there is a gradual catching-up process to the equilibrium core-periphery price relationship. We hypothesize that this long term relationship is one of proportionality, subject to a possible linear drift. Thus, long-term price trends in, for example, Cote d'Ivoire, may be represented by:

$$\log P^*_{civ} = \alpha + \log P_{fra} + \beta T.$$

Here T represents a linear time trend. The short-term dynamics of the price level are composed of a partial adjustment to changes in core inflation plus convergence to the long-term price trend:

$$\Delta \log P_{civ} = \gamma \Delta \log P_{fra} - \zeta(\log P_{civ} - \log P^*_{civ})_{-1}.$$

For this representation to be valid with no time trend (i.e. the null hypothesis $\beta = 0$), the core and periphery price levels should be cointegrated. Figure 3 plots the gaps between core and periphery price levels: the figure is in logs and shows that deviations of plus or minus about 10 per cent have been observed. There is no clear trend apparent in the gaps, suggesting again that the series may have a common trend. Nevertheless, using standard tests, the quarterly data series cannot reject

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18 Export performance does influence private, and possibly government, consumption spending. Pooled cross-country regressions (also based on deviations from mean share) of government consumption found domestic credit to government significant (t=2.2), with exports less so (t=1.8). The RSQ in that regression, which included a lagged dependent variable was 0.63. For private consumption, also with a lagged dependent variable, government consumtpion had a t-statistic of 3.0 and exports 2.7, with an RSQ of 0.85.

Table 1: UMOA: COUNTRY-SPECIFIC PART OF INFLATION.

Equation No:	1		2		3	4	5	6
Explanatory:	Coeff	t	Coeff	t	t	t	t	t
Government Consumption	1.072	(4.8)	0.893	(3.8)	(3.1)	(3.0)	(2.8)	(3.0)
Lagged Dependent Variable	0.693	(10.7)	0.719	(11.2)	(9.9)	(10.0)	(9.9)	(10.1)
Domestic Credit to Government			0.053	(2.1)				
Domestic Credit						(1.4)		
Money (M2)							(1.1)	
Value of Exports								(1.8)
Private Consumption					(0.1)	(0.0)	(0.2)	(0.7)
DUM BF76*	-0.18	(4.6)	-0.19	(4.9)	(4.2)	(4.4)	(4.2)	(4.3)
DUM SE74*	0.14	(3.5)	0.14	(3.6)				
RSQ	0.721		0.736		0.676	0.684	0.681	0.689
DW	1.656		1.772		1.69	1.73	1.7	1.73
SER	0.0394		0.0386					

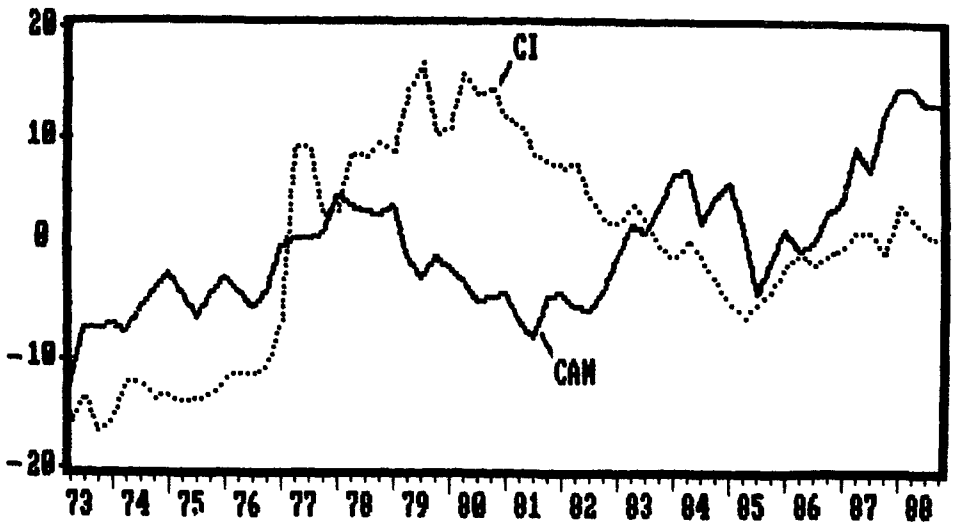
This table shows some regressions of a pooled cross-section and time series of country-specific elements of inflation.
The regressions are designed to measure the impact of demand and policy factors on local inflation.
Dependent variable is remainder after subtracting first principal component from (log(CPI)).
Explanatory variables are country shares in UMOA totals expressed as deviations from sample period averages.
Cross-Section and Time Series, Sample Period: 1970-86.

For equations 3-6 the t-statistics only (and not the estimated coefficients) are shown.

*Note: Some equations also included intercept dummies for two outliers, Burkina Faso 1976 and Senegal 1974.

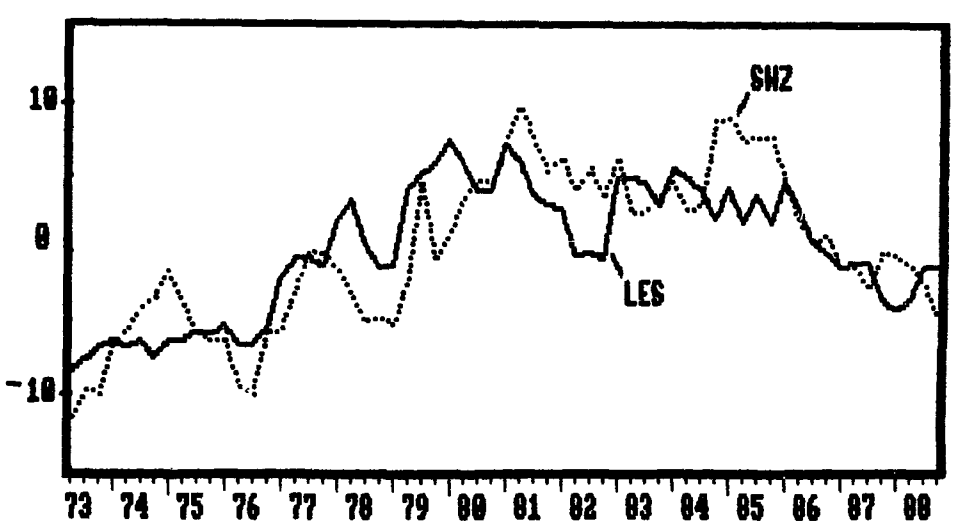
Figure 3

CPI DIFFERENCES CORE-PERIPHERY (%) CAMEROON AND COTE d"IVOIRE



___Cameroon .....Cote d'Ivoire

CPI DIFFERENCES CORE-PERIPHERY (%) LESOTHO AND SWAZILAND



___ Lesotho .....Swaziland

lack of cointegration for each of the countries except Cameroon[19]. However, these tests used have relatively low power, and therefore the test results should not preclude use of an error-correction framework.

The regression results[20] for the dynamic model are presented in Table 2. A substantial immediate pass-through is found for all countries except Cameroon, with the coefficient γ ranging from 0.66 (Swaziland) to 1.14 (Cote d'Ivoire) - the latter figure not significantly larger than one. The catch-up coefficient ζ is significantly positive in all cases, though quite small ranging from a low of 0.075 per quarter (Cote d'Ivoire) to a high of 0.175 (Cameroon). This implied slow adjustment (half of the adjustment takes between about four and nine quarters) is consistent with the failure to reject lack of cointegration: if adjustment is that slow, longer time series would be necessary to provide conclusive evidence of cointegration. The time trends are not significant for any of the four countries in the common sample period 1973-88 and the equations were reestimated without trends as shown[21]. (Addition of the rate of expansion of the real credit supply as an indication of monetary conditions did not add significantly to the equations either).

The simple equations which have been estimated confirm the general picture of long-term inflation trends being determined mainly by core inflation, i.e. French and South African inflation respectively for the two zones.

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19 Three of the tests recommended by Engle and Granger, 1987, were employed, namely the CRDW, the Dickie-Fuller and the augmented Dickie-Fuller with four lags. Except for the last test, which was significant for Cameroon at the five per cent level, none was significant even at the ten per cent level.

20 We also allowed some dummy variables to have a transitory impact on inflation. As in the later sections of the paper, each equation was estimated with and without time trends (the reported equations include these trends only where significant), and dummies for any observation more than three standard deviations outside the estimated regression line. Correction for up to second-order autocorrelation was also made where necessary. In addition to the basic specification, less parsimonious representations with longer lags were tried, but the restrictions implied by the reported equations held.

21 For the franc zone countries data is available back to 1968; using this longer series the situation regarding time trends is less clear. Cameroon displays a significant time trend, but in the equation for Cote d'Ivoire the time trend remains below conventional significance levels. Both estimated time trends imply values of long-term drift in periphery inflation of about one per cent per annum (estimated γ is 1.0 per cent per annum for Cote d'Ivoire and 1.2 per cent per annum for Cameroon). Such slow drifts do not necessarily imply that prices for individual commodities drifted apart as between core country and periphery; they would, for example be compatible with shifting relative composition of the consumption baskets.

Table 2: Dynamics of Inflation Transmission

Cameroon:

$$dP = 0.029 + 0.23\ dP_{core} - 0.175\ GAP_{-1} + 0.075\ D853$$
$$\quad (4.0) \quad (0.7) \qquad (3.2) \qquad (3.6)$$

RSQ=0.307 SEE=0.0203 DW=1.98 73.2-88.4

Cote d'Ivoire:

$$dP = 0.002 + 1.14\ dP_{core} - 0.075\ GAP_{-1} + 0.147\ D772$$
$$\quad (0.2) \quad (3.6) \qquad (2.4) \qquad (6.1)$$

RSQ=0.517 SEE=0.0237 DW=2.00 73.2-88.4

Lesotho:

$$dP = 0.007 + 0.69\ dP_{core} - 0.087\ GAP_{-1} + 0.056\ D831 + 0.047\ D792$$
$$\quad (1.0) \quad (3.3) \qquad (2.1) \qquad (3.8) \qquad (3.2)$$

RSQ=0.383 SEE=0.0146 DW=2.18 73.2-88.4

Swaziland:

$$dP = 0.001 + 0.66\ dP_{core} - 0.112\ GAP_{-1} + 0.074\ D793 + 0.060\ D844$$
$$\quad (0.1) \quad (2.1) \qquad (2.3) \qquad (3.5) \qquad (3.1)$$

RSQ=0.404 SEE=0.0191 DW=1.84 73.2-88.4

Notes: P is log of CPI in periphery country. P_{core} is log of CPI in core country (France for the franc zone, South Africa for the rand zone), GAP is the log ratio of the two price indices. prefix "d" denotes first difference. D's are one-shot intercept dummies for the dates indicated. T-statistics are in parentheses.

However, the regressions "explain" between 30 and 58 per cent of quarterly variations in inflation leaving considerable deviations to be explained by other factors.

3 Credit expansion and monetary equilibrium

If credit expansion, one of the chief tools of monetary policy, does not have an important effect on inflation it is important to assess what its effects are. The openness of the economies suggest that the effects of credit policy on output and employment are also likely to be weak. Accordingly, one may suppose that if there is too much credit expansion, it will simply leak out into imports or capital movements; if there is too little, there will be made up by capital inflows. A visual examination (Figure 4) of the trends in real money and credit suggests that credit expansion has had little impact on the determinants of money demand (with the possible exception of Cameroon before 1986). This view appears confirmed by the results of statistical analysis of the short- and long-term relation between domestic credit expansion and monetary growth in three of four countries examined.

Credit and Money: A Model

A simplified monetary balance sheet indicates that the counterparts of the money stock are chiefly domestic credit of the banking system and the external reserves. We may regard domestic credit as subject to policy control while the other counterparts adjust endogenously. If an expansion in domestic credit leads to increased output or interest rates on a sustained basis, then demand for money can be expected to respond. However, if domestic credit expansion has no long-term effect on output (or interest rates), it will be offset by a reduction in the other counterparts, essentially through a fall in external reserves.

In order to explore this issue in the absence of an adequate database for a proper quarterly demand for money estimate, we inquire as to whether credit is an empirical proxy for unmeasured determinants of the long-term demand for money. Thus we write the demand for money as:

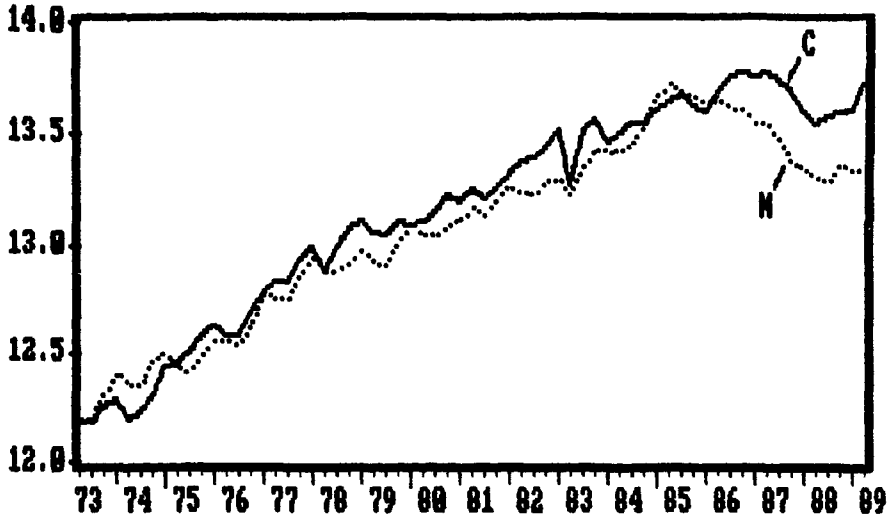
$$M^d = \beta + \gamma C + \delta X,$$

where C is domestic credit and X is other measured variables affecting the demand for money. The hypothesis to be tested is that the coefficient γ is zero. We assume convergence of actual to desired money stock according to:

$$\Delta M = \alpha \Delta C + \zeta(M^d_{-4} - M_{-4}).$$

Figure 4

(LOG-) CREDIT AND MONEY IN REAL TERMS: CAMEROON



(LOG-) CREDIT AND MONEY IN REAL TERMS: COTE d'IVOIRE

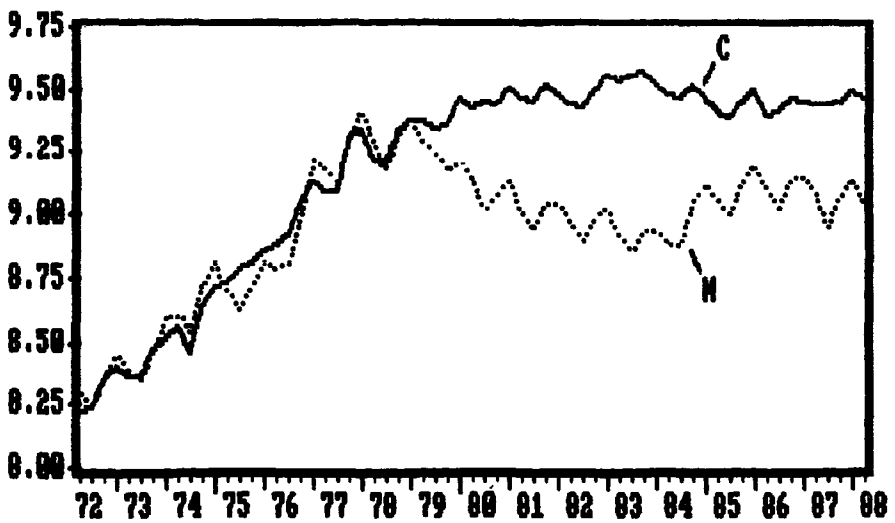
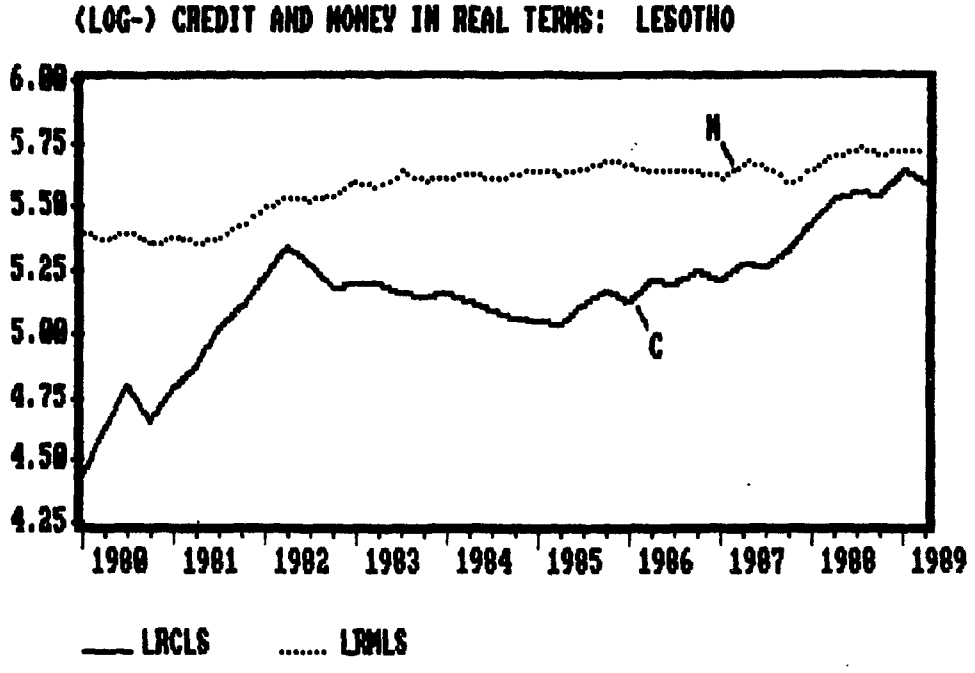
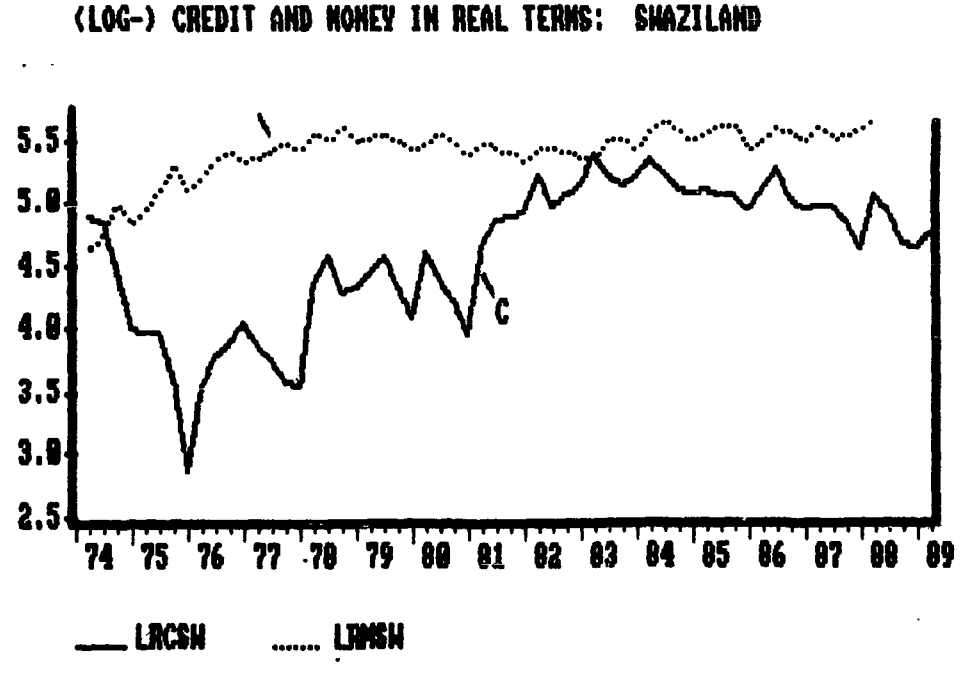


Figure 4 (cont'd)





This process combines an immediate impact of credit on money offset later by a convergence of money (at the rate ζ) to its desired level, possibly depending on credit depending on whether γ is zero[22]. This provides the estimating equation:

$$\Delta M = \alpha \Delta C + \beta^* + \gamma^* C_{-4} + \delta^* X_{-4} + \zeta M_{-4},$$

where,

$$\beta^* = \beta\zeta,$$

$$\gamma^* = \gamma\zeta,$$

$$\delta^* = \delta\zeta.$$

Evidence: Some estimates of this equation are reported in Table 3 with time trends and dummies substituted for the "other factors" X. These provide a test of whether the effect of expansions in domestic credit (C) have a

22 Lag lengths other than four give generally similar results.

long-term γ effect as well as a short-term α effect on the money supply[23]. This is a standard error-correction framework which allows the expansion in domestic credit to have an effect which is spread out over time. If α equals unity, then the short run effect of credit expansion on money is one-for-one. Otherwise, domestic credit expansion partly leaks out into the balance of payments even in the first quarter. The coefficient ξ measures the speed of convergence to the steady state value of money. If the coefficient γ is not

---

23 Note that this equation does not report any interest sensitivity in the demand for money. Most commentators have supposed that the openness of the capital market might mean that such interest differentials as emerge between the CFA countries and France - and they have approached two percentage points at times even since 1981 - would be enough to induce important capital flows. This should show up as a degree of interest sensitivity in the demand for money. An earlier analysis of the demand for money in Cote d'Ivoire did identify an interest rate effect in the Ivorian demand for money, but the coefficient was barely significant and not robust to changes in equation specification.

That study (Honohan 1988) reported the following equation for monthly data (seasonally adjusted) in M2, 1979.01 to 1987.06:

$$\underset{\quad}{\text{DelM}} = \underset{(3.16)}{0.0401} - \underset{(3.92)}{0.103}\ \text{DelM}_{-1} + \underset{(1.93)}{0.567}\ R^{diff} - \underset{(1.67)}{1.954}\ \text{Time} + \text{Dummies}$$

RSQ = 0.941 SEE = 0.0262 DW = 1.81

Where DelM is the logarithmic monthly change in M2; and R^{diff} is the differential between money market rates in Cote d'Ivoire and France. The dummies intercept shifts to cope with shifting seasonality at the beginning and end of the harvest season: they exclude all outliers beyond four standard deviations.

The interesting feature of this equation is the possible sensitivity of the money stock to the international interest rate differential. However the effect is very imprecisely measured and is not quite significant at the five per cent level. One could not assert with confidence that the effect was not a statistical artifact.

Furthermore it is not robust to fairly small changes in the specification or in the sample period. By extending the sample it becomes evident that in the mid 1970s there was a positive association between the interest differential in favour of Abidjan and the quantity of money. While this can be blamed on simultaneity, and interpreted as a policy response and thus a supply effect.

Leite and Makonnen (1986) were equally unable to find a robust impact of interest on saving in the BCEAO countries.

One plausible hypothesis explaining the difficulty in identifying a strong effect is that mobile liquid assets of Ivorians are already held outside of Africa. On this interpretation, applicable possibly also to the other CFA countries, the money supply in the CFA zone is held primarily for transactions purposes; the role of interest rate policy in this low-inflation environment may then be more to allow for rational allocation of credit than to ensure that mobile funds remain in Africa.

significantly different from zero, no long term relation between credit and money can be reliably postulated. All variables are measured in seasonally adjusted real terms[24].

(a) The results: For three of the four countries the expectation that domestic credit will have a transitory effect only is confirmed. Table 3 shows illustrative regression equations. In the franc zone the results for Cote d'Ivoire give the best results in this respect. Rather more than one-half of domestic credit "leaks out" in the same quarter with no significant long-term effect[25]. The two rand zone countries display no strong link between credit and money either in the short run (α is small or insignificant) or in the long run (γ is insignificant).

Cameroon once again provides the exception. Despite experiments with time trends, which proved insignificant, the lagged credit term persists as significant. About one-third of credit expansion seems to augment the money stock permanently (indeed the point estimate of γ is .57). We can only retain the hypothesis on the assumption that credit here provides a better proxy for the omitted variables determining money demand. It may also be that credit expansion in Cameroon was more conservative and in line with general economic expansion.

4 Interest rates

In all of the countries that we are looking at some interest rates are controlled administratively. In a closed economy, the existence of administrative controls could spill over and affect uncontrolled interest rates. Thus, for example, compulsory non-remunerated reserve requirements would be expected to affect deposit and lending rates of the commercial banks. The openness implied by the fixed exchange rate and freedom of capital movements in the currency unions suggests that uncontrolled rates, at least for large deposits and for loans to first-class risks may be determined by international arbitrage rather than by domestic considerations. This prompts us to examine available data to see to what extent domestic interest rate controls influence the uncontrolled rates.

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24 The franc zone data is deflated by the French consumer price index.

25 Actually, a clear short-run impact of credit on money was obtained for all of the UMOA countries. And, with the possible exception of Burkina Faso, the coefficient γ was insignificant, implying no long-term effect.

Table 3: Domestic Credit and Money: Short and Long-Term Impacts

Cameroon:

$$dM = -0.81 + 0.469\ dC - 0.149\ M_{-4} + 0.234\ C_{-4} - 0.0031\ T - 0.112\ D874$$
(1.9) (7.8) (2.8) (3.8) (2.9) (3.1)

RSQ=0.65 SEE=0.035 DW=1.94 74.2-89.2

Cote d'Ivoire:

$$dM = 0.64 + 0.377\ dC - 0.086\ M_{-4} + 0.015\ C_{-4} - 0.128\ D794 \quad rho1=0.25$$
(2.8) (3.9) (2.2) (0.6) (3.5) (1.8)

RSQ=0.54 SEE=0.036 DW=2.01 73.4-88.2

Lesotho:

$$dM = 0.55 + 0.151\ dC - 0.130\ M_{-4} + 0.036\ C_{-4} \quad rho1=-0.25 \quad rho2=-0.48$$
(3.5) (2.3) (3.2) (1.5) (1.5) (3.0)

RSQ=0.43 SEE=0.026 DW=2.22 81.3-89.3

Swaziland:

$$dM = 0.55 + 0.023\ dC - 0.109\ M_{-4} + 0.012\ C_{-4} \quad rho1=-0.24$$
(2.7) (0.5) (2.7) (0.9) (1.7)

RSQ=0.14 SEE=0.066 DW=2.13 75.3-89.3

Notes: M is log of wide money supply M2, C is domestic credit; prefix "d" denotes first difference. Rho's are likelihood maximizing autocorrelation coefficients. D's are one-shot intercept dummies for the dates indicated. All variables seasonally adjusted. f-statistics in parentheses.

4.1 The CFA zone

Relevant data is not really available for the franc zone. The extensive control of interest rates exercised by the authorities in the two CFA zone has resulted in fairly wide differentials of these controlled rates vis-a-vis Paris. This is especially true in respect of bank lending rates for lending which has been refinanced by the Central Bank at a subsidised rate. Naturally, such refinancing is rationed and so the relevant rates of interest are not market-clearing. Revisions in the administered rates have been rather infrequent. For example the normal rediscount rate of the BEAC stood at 9 per cent from late 1982 until early 1986, a period during which Paris interbank rates fell from over 13 per cent to less than 9 per cent.

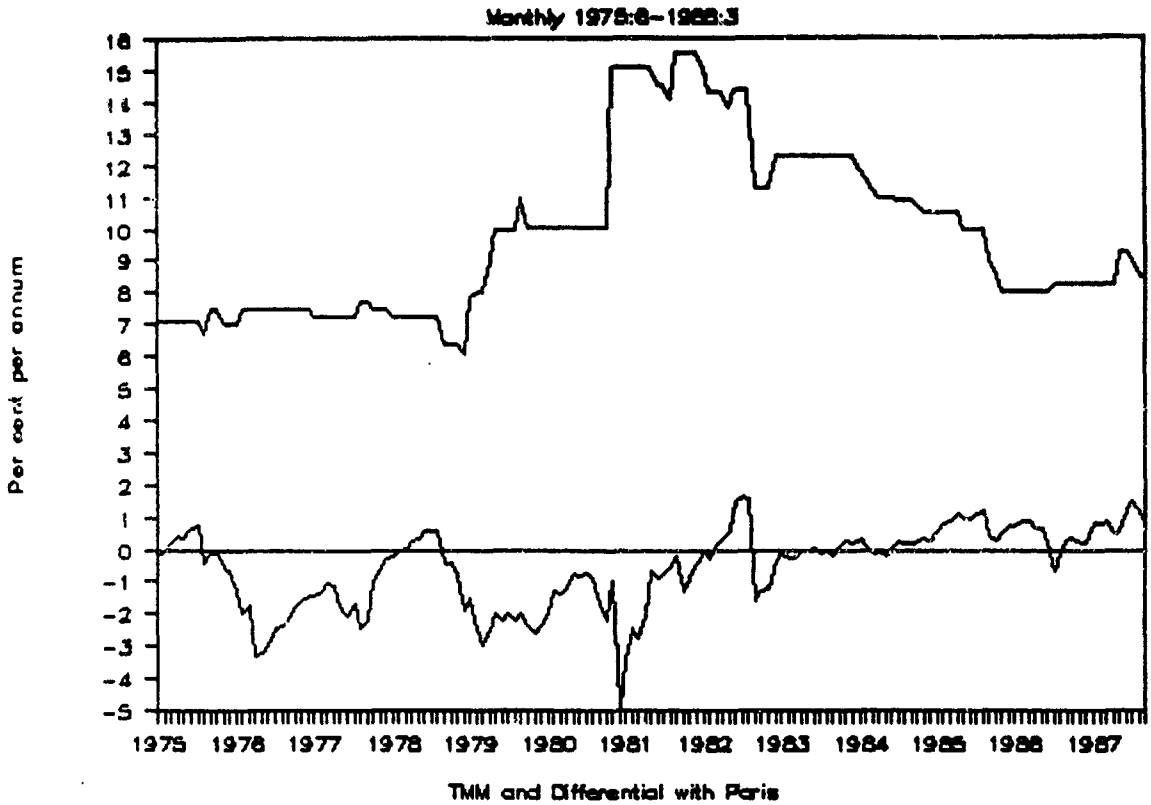
The most frequently revised rates have been the BCEAO's so called Taux du Marche Monetaire (TMM) which apply to bankers' deposits with the Central Bank and to some non-preferential redicounts. Figure 5 plots the overnight lending TMM against Paris money market rates and displays the fairly close correlation between the two in recent years. However, because many UMOA banks are persistently in debt to the BCEAO, and because borrowing at the TMM is subject to ceilings and to the discretion of the BCEAO, the TMM can only be considered as an imperfect indicator of the marginal cost of funds to UMOA banks. In particular it is not clear how closely interbank rates or the wholesale deposit rates offered by banks follow the TMM (no time series on these rates is collected by the BCEAO). Because of the weak condition of many UMOA (and BEAC) banks, confidence is low among wholesale depositors and the interbank markets are very thin. As explained above there is no strong evidence of a high degree of interest rate sensitivity of money demand in UMOA countries, a fact which suggests that only minimum working balances are held in banks in the UMOA, with most portfolio investment already placed in France, Monaco or elsewhere. It is possible therefore that uncontrolled interest rates also deviate from French comparators; but in the absence of reliable series on non-administered interest rates in the CFA zone, we are unable to draw definite conclusions.

4.2 The rand zone: effectiveness of interest rate policy in Lesotho[26]

We now examine evidence from Lesotho, where data is more readily available on uncontrolled interest rates. The Central Bank of Lesotho sets only the prime lending rate, the minimum savings deposit rate, as well as the Treasury bill rate and the rates on banks' deposits with the CBL. These

26 This section draws on earlier work done jointly with Ignacio Mas.

FIGURE 5: UMOA: MONEY MARKET INTEREST RATE



rates are revised several times per year and changes usually, but not always, follow the corresponding South African rates fairly closely. However, the prime rate has generally been held below the South African prime rate. The deposit rates offered by the CBL are also somewhat below RSA rates. Since it began to be regulated in 1986, the minimum rate on savings deposits, while it is set at about the same level as the rate on large savings deposits in RSA, it is much higher than that offered by RSA banks and building societies for small savings deposits. There are neither floors nor ceilings on the bank lending rates (despite the administered "prime lending rate", which mainly serves as an indicative rate) or on the bank deposit rates other than the savings rate. The question to be addressed here is whether the RSA rates or the Central Bank administered rates are more relevant in determining the non-administered rates in Lesotho.

Lending Interest Rates

The average lending rate in Lesotho has at all times exceeded the prime rate, usually by two to three percentage points, but exceptionally by as much as 7 points during 1984 (Figure 6). On the other hand, the average lending rate in Lesotho fell short of the South African prime rate throughout 1984.

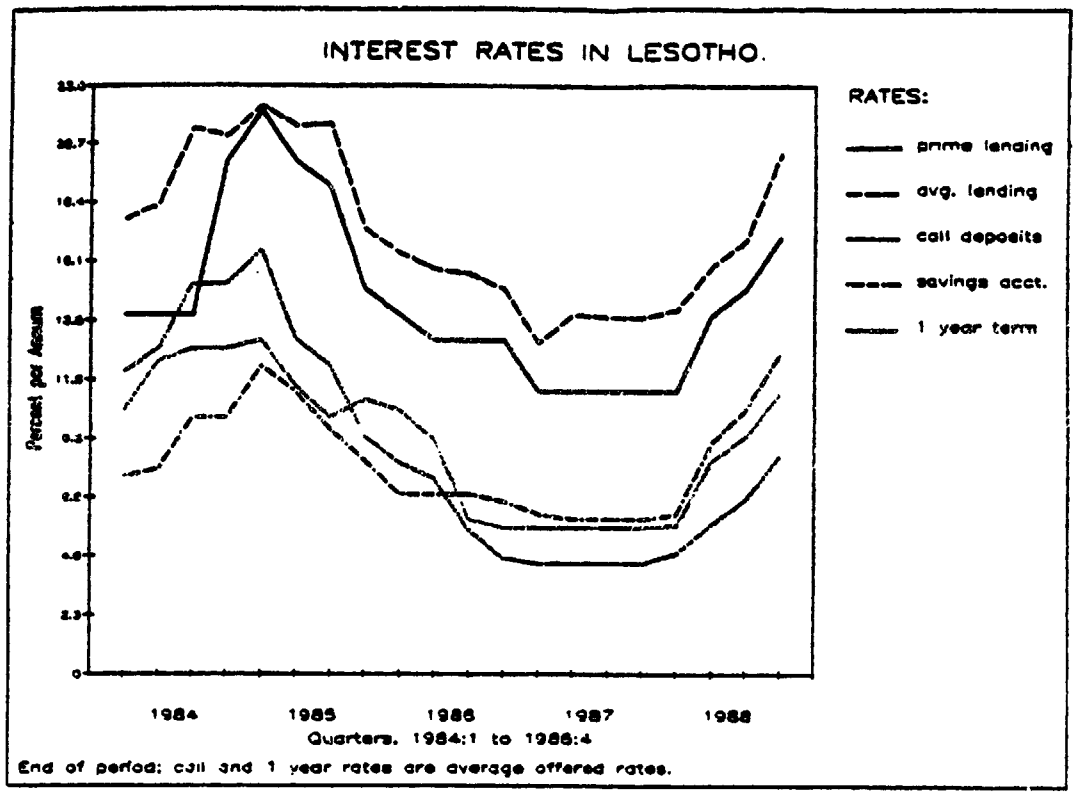
The prime rate in Lesotho is set administratively: to what extent does it determine the average lending rate? Even if the prime rate is out of line with market conditions, it may persist because banks can adjust the average lending rate above prime. One hypothesis is, then, that the banks counter any discrepancies between the prime rates in Lesotho and South Africa by adjusting their average lending rates relative to the prime rate in Lesotho. The following equation, estimated on quarterly data from 1984 to 1988 suggests that such an hypothesis is at least partially true.

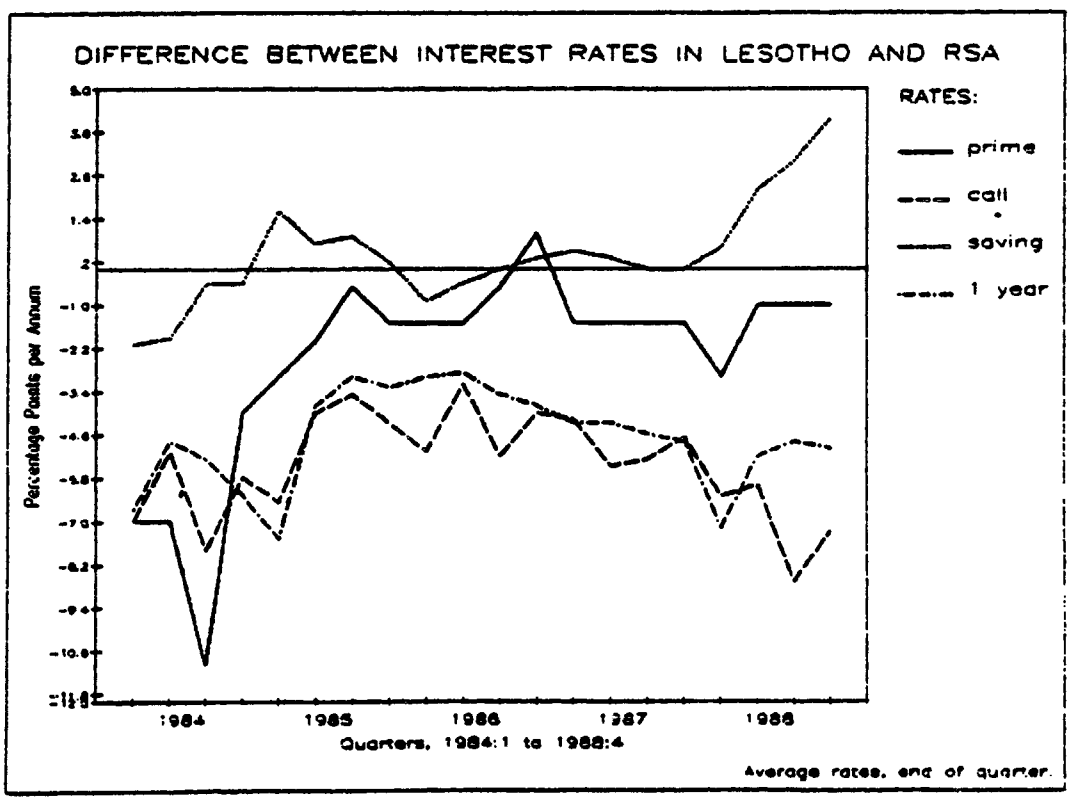
$$dAVG_{les} = \underset{(3.4)}{1.222} + \underset{(6.7)}{0.990}\ dPRM_{rsa} - \underset{(4.0)}{0.552}\ GAP(-1) + \underset{(3.1)}{0.397}\ (PRM_{les}-PRM_{rsa})$$

$$RSQ = 0.749 \qquad SEE = 0.848 \qquad DW = 2.19$$

where AVG is the average lending rate, PRM is the prime rate, GAP(-1) is the lagged difference between AVG and PRM_{rsa}, and "d" denotes quarterly change.

Figure 6


INTEREST RATES IN LESOTHO.
RATES:
prime lending
avg. lending
call deposits
savings acct.
1 year term
Percent per Annum
1984
1985
1986
1987
1988
Quarters, 1984:1 to 1988:4
End of period; call and 1 year rates are average offered rates.


DIFFERENCE BETWEEN INTEREST RATES IN LESOTHO AND RSA
RATES:
prime
call
saving
1 year
Percentage Points per Annum
1984
1985
1986
1987
1988
Quarters, 1984:1 to 1988:4
Average rates, end of quarter.

This equation suggests that the average lending in Lesotho is dominated by the South African prime rate. When the prime rates in Lesotho and the RSA are increased, the average lending rate increases entirely in step. If, on the other hand, the prime rate in Lesotho does not increase while the prime rate in the RSA does, the average rate originally lags behind in the increase, but catches up eventually. In this case, one half of the gap between the two rates is closed in each quarter.

The conclusion is that the authorities' ability to influence average lending rates is at most transitory. Within a few quarters the banks have adjusted their lending rates to their traditional relationship with those in RSA.

Deposit Interest Rates

Commercial banks in Lesotho offer a variety of deposit accounts: savings accounts, 24 hour call accounts, and term accounts of maturity 31 days, 88 days, 6 months or one year. Only the interest rate on savings accounts is being fixed by the Central Bank, all other interest rates being discretionary for the banks. Since it began to be administered by the Central Bank in 1986, the savings rate has increased far more rapidly than the other rates (Figure 6). From being the lowest of the three deposit rates shown in 1984 it has become the highest. It seems that movements in this administered rate have had little influence on the other posted rates. To verify this apparent lack of influence, regression analysis was performed on the quarterly evolution of interest rates between 1984 and 1988. The following equation provided a reasonable fit to the movements in the Lesotho call deposit rate:

$$dCALL_{les} = \underset{}{-2.94} + \underset{(5.4)}{0.503}\ dCALL_{rsa} - \underset{(8.8)}{0.530}\ GAP(-1) \qquad (5.4)$$

$$RSQ = 0.861 \qquad SEE = 0.597 \qquad DW = 2.65$$

where dCALL means the quarterly change in the call rate, the superscripts "les" and "rsa" refer to the countries and "GAP(-1) is last quarter's differential between the rates in the two countries. (T-statistics in parentheses).

The above equation implies that about one-half of any change in the RSA call rate is transmitted in the same quarter to the Lesotho call rate. Over time, the gap between the two rates tends to converge to a steady six

per cent or so. Inclusion of the Lesotho savings rate in the above equation did not add significantly to the explanatory power of the equation.

The statistical evidence thus suggests that market forces, in the form of the competitive rate in RSA, do play the determining role in the movements of non-administered deposit interest rates in Lesotho, but that there remains a persistent international differential between the average levels of these rates.

5 Concluding remarks

By joining currency unions, some fifteen African countries have enjoyed an otherwise hard-to-achieve degree of credibility for policies of monetary stability. The conclusion to be drawn from the empirical analysis in this paper is that membership of a currency union does provide considerable discipline in monetary and price developments. While the members of the African currency unions do not have identical inflation or interest rates, the evidence discussed above implies that the long-term trend of inflation converges to that in the core country (France or South Africa). Transitory deviations are apparently caused more by fiscal policy than by monetary deviations. More limited data on interest rates also suggests convergence of the movements of uncontrolled interest rates to those of the core country. Excessive credit expansion, rather than stimulating the economy, tends to leak out into the balance of payments.

The currency unions have not been without their episodes of financial stress. In particular excessive government spending in some countries has resulted in heavy problems of indebtedness. Furthermore, wage levels, which have not been studied in this paper are thought by some to have adjusted less well to external pressures[27]. Nevertheless, the evidence provided in this paper points to real stabilizing benefits of membership in a currency union.

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27 See Levy and Newman (1989) for a discussion of wage adjustment in Cote d'Ivoire based on micro data. A general discussion of the adjustment problems of the franc zone is in Devarajan and de Melo (1987). A companion paper, Honohan (1989), is also relevant in this context.

References.

Bhatia, R.J. (1985), The West African Monetary Union: An Analytical Review, (Washington, D.C., International Monetary Fund).

Devarajan, S. and J. de Melo (1987a), "Evaluating Participation in African Monetary Unions: A Statistical Analysis of the CFA Zones", World Development, Vol. 15, No. 4, pp. 483-96

Devarajan, S. and J. de Melo (1987b), "Adjustment with a Fixed Exchange Rate: Cameroon, Cote d'Ivoire and Senegal", The World Bank Economic Review, Vol. 1, No. 3, pp. 447-87

Engle, R.F. and C.W.J. Granger (1987), "Co-Integration and Error-Correction: Representation, Estimation and Testing", Econometrica, Vol. 55, No.2, pp. 251-76.

Giovannini, A. (1988), "How do Fixed Exchange Rate Regimes Work?", NBER Working Paper.

Guillaumont, P. and S. (1984), Zone franc et developpement africaine, (Paris, Economica).

Guillaumont, P. and S., eds. (1988), Strategies de developpement comparees: zone franc et hors zone franc, (Paris, Economica).

Guillaumont, P., S. Guillaumont and P. Plane (1988), "Participating in African Monetary Unions: An Alternative Evaluation", World Development, Vol 16, No. 5, pp. 569-76.

Honohan, P. (1983), "Measures of Exchange Rate Variability for One Hundred Countries", Applied Economics, Vol. 15, pp. 583-602.

Honohan, P. (1988), "Resource Mobilization by the Banking System in Cote d'Ivoire", mimeo. World Bank, CECFP, April 1988.

Honohan, P. and P. McNelis (1989), "Is the EMS a DM zone? Evidence from the realignments", Economic and Social Review, Vol. 20, pp. 97-110.

Leiderman, L. (1987), "Price and Wage Flexibility in the Adjustment Process of franc zone countries: the Ivory Coast", University of Chicago, mimeo.

Leite and Makonnen (1986), "Savings in the BCEAO countries", Savings and Development, Vol 10. No. 3, July-September.

Levy, V. and J. L. Newman, (1989), Wage rigidity: micro and macro evidence on labor market adjustment in the modern sector", World Bank Economic Review, Vol. 3, No. 1, January.

Macedo, J.B. de (1984), "Collective Pegging to a Single Currency: The West African Monetary Union", in S. Edwards and L. Ahamed, eds., Economic Adjustment and Exchange Rates in Developing Countries, (Chicago: University Press)

Paraire, J.-L. (1988), "L'instabilite des taux de change", in Guillaumont, P. and S., eds. (1988).

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